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# **A Research Framework for the Adoption and Usage of Executive Information Systems By Organisational Executives: An Exploratory Study**

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## **Abstract**

*To improve the performance of executives' work, a number of organisations have implemented executive information systems (EIS). Although the use of EIS is important in executives' work, majority of executives are unwilling to use EIS applications. By using social factors, habits and facilitation conditions variables from Triandis' framework, this paper extends TAM to derive variables to address the problem of the low usage of EIS by executives. This paper reports on research in progress in Australia on the adoption and usage of EIS by executives. The preliminary results suggest that executives' experience in EIS positively relates to their experience in computer-based information systems. The results also suggest a high degree of perceived usefulness, perceived ease of use as well as positive attitude towards using EIS. Further, the results also suggest that executives consider social factors in using EIS in their work. Finally, the results suggest facilitating conditions variables such as EIS development process, EIS management process and organisational environment are strongly related to the adoption and usage of EIS by executives.*

**Keywords:** EIS, Cultural, Social, Organisational factors, Executives, Theoretical Foundation, User acceptance, Usage

## **INTRODUCTION**

Executive information systems (EIS) are computerised systems that provide executives with on-line easy access to internal and external information relevant to their business success factors (Rainer and Watson, 1995). The aim of EIS is to bring information from the external environment and all parts of an organisation and present it in a way that is meaningful to executive users (McBride, 1997). Nonetheless, the actual engagement or use of these systems by executives is relatively low (Young & Watson, 1995; Thodenius, 1995; Fitzgerald, 1998).

In recent times the use of EIS in organisations has spread to managers at various levels (Leidner & Elam, 1994; Nord & Nord, 1995; Fitzgerald, 1998; Vlahos et al., 2000; Salmeron, 2002; Singh et al., 2002). Although this spread has given EIS new names such as enterprise information system, business intelligence (BI) software and Balanced Scorecard (Liang & Miranda, 2001), the problem of underutilisation by the executives remains unresolved. In Fitzgerald and Murphy (1994) for instance, the usage gap between executives and middle managers was 36%. They found that only 32% of EIS users were at executive level while the majority (68%) users were at middle management level. This finding was confirmed by a further study by Fitzgerald (1998). These findings suggest a higher degree of utilisation of EIS at the middle management level, than at the strategic management level, which is the level an EIS was meant to support.

Because the implementations and operations of EIS are more or less championed by senior executives with broad and general management support (Thodenius, 1995; McBride, 1997; Fitzgerald, 1998; Poon & Wagner, 2001) one would expect a significant level of use by the senior management. But the actual use by senior managers is very small (Kraemer et al., 1993).

A number of researchers (e.g., Robey, 1979; Szajna, 1993; Davis, 1993; Young & Watson, 1995; Mao, 2002) have investigated organisational and technological factors that determine user acceptance of IS including EIS. Although these research efforts have provided some valuable results, they have been constrained by lack of appropriate reference theoretical foundations and variables for key determinants of user acceptance and use of information systems. Kling who studied the social impact of human computer argued that, "in order to identify the social impact of computing one must have at least implicitly a theory of the casual power that computerised systems can exert upon individuals, groups, organisations, institutions, social networks, social world and other social entities" (p. 151).

Several studies (Bergeron et al., 1995; Kumar & Palvia, 2001; Singh et al., 2002) have reported the growing popularity of EIS in organisations as new concepts such as enterprise resources planning (ERP), data warehousing, data mining, web-base portal to “dashboard” and “scorecards” and the on-line analytical processing (OLAP) engine have paved the way for a new era of managing corporate data. Despite these, the underutilisation of EIS by senior managers remained an important challenge to user organisations. “Top officers don’t use executive information systems” (Wildt, 1991 p. 38).

The characteristics of EIS such as, the ability to move freely between a high-level view of data and a detailed view (drill-down’), a concentration on data relating to key performance indicators and critical success factors, the ability to highlight exceptions and variances automatically and to present information in graphical, tabular, textual and colours to the executives make EIS a suitable tool for executives’ work (McBride, 1979).

The motivation of this paper is the marked limited research on the actual use of EIS by executives and lack of appropriate reference theoretical foundation for individual, organisational, social and cultural variables in determining the factors for user acceptance and use of EIS. The primary focus of the paper is to investigate organisational, social, cultural and individual factors that can explain executives’ behaviour towards the adoption and usage of EIS in organisational settings. Furthermore, the paper aims to highlight and explain the importance of these factors in determining the adoption and usage of EIS by executives.

The potential contribution of this paper is the research model based on organisational behaviour theories, which provides a future direction in explaining executives’ behaviour towards EIS adoption and usage. The preliminary results reported in this paper provide better understanding of the behaviour of executives in using EIS. Moreover, the results would assist EIS developers to understand the core information processing requirements for executives’ tasks for which they are building EIS in order to implement appropriate system functionalities to support those tasks. In an academic sense, the new framework and research model will assist researchers to further explain human behaviour towards IS acceptance and usage.

The remainder of the paper is organised as follows. First, we examine past research studies on EIS usage. Second, we address the research problem and research questions of the study. Third, we look at the theoretical perspective in IS research including TAM and its implications in explaining user acceptance and use of IS as well as Triandis’ (1979) framework variables such as habits, social factors and facilitating conditions relevant for the study. Next, we develop the research model for the study followed by the research hypotheses and implications from empirical studies. Finally, we provide the research methodology, data collection methods, questionnaire design, the preliminary results, conclusions and future direction.

## PAST RESEARCH STUDIES ON EIS USAGE

Research studies on EIS usage can be broken into five major areas as follows: (i) *Factors influencing and explaining use*, (ii) *Overall benefits from EIS*, (iii) *Pattern of use and frequency of use*, (iv) *Impact of EIS on managerial activities*, and (v) *Emergence of EIS*. In the classifications below (Table 1), the majority of research on EIS has been exploratory instead of theory testing. Only a limited number of studies (e.g., Bergeron et al., 1995; Ditsa, 2003) in research area (i) employed appropriate reference theories to gain insight into factors influencing the actual use of the systems by senior managers. Without appropriate reference theories, it will be difficult to realise the importance of the other four focussed areas.

<u>Research Areas</u>	<u>Reference</u>
i. <i>Factors influencing/explaining EIS use</i>	Young & Watson, 1995; Rainer & Watson, 1995; Bergeron, et al., 1995; Basu et al., 2000; Poon & Wagner, 2001; Singh et al., 2002; Ditsa, 2003
ii <i>Overall benefits from EIS</i>	Nord & Nord, 1995; Kelly, 1994; McBride, 1997; Nanhakumar & Jones, 1997
iii <i>Patterns of use &amp; frequency of use</i>	Thodenius, 1995; Seeley & Targett, 1999;
iv. <i>Impact of EIS</i>	Rockart and Delong, 1992; Laidner & Elam, 1994; Handzic, 1997; Wheeler, 1996; Stein & Nasib, 1997; Liang & Miranda, 2001; Kumar & Palvia, 2001; Salmeron, 2002.
v. <i>Emergence of EIS</i>	Houdeshel & Watson, 1987; Rockart & Treacy, 1992; Fitzgerald & Murphy, 1994; Fitzgerald, 1998,

Table 1: Classification of EIS Usage Research

Nandhakumar and Jones (1997) witnessed an EIS development project in their in-depth study of the development methods in organisations where potential executive users were not involved in the design phases. As a result, they suggest that there should be better theoretical conceptualisation of the dynamic relationship between the developers and executives to assist in understanding how the relationship shapes, and is shaped by various constraints.

McBride (1997) studied the progress of an EIS project within a manufacturing organisation in the UK over a 9-year period. The study demonstrates the importance of the interaction between the business environment, the organisational environment and the perceptions and interpretations of events by stakeholders on the success or failure of EIS. Particularly, it illustrates the importance of the organisational context and the dynamic nature of the social, economic and technical factors critical in shaping acceptance and use of EIS in organisations.

The above two studies suggest that the roots of the success or failure of IS including EIS can be attributed to social, cultural and organisational factors and not technical factors alone.

## RESEARCH PROBLEM AND QUESTIONS

The research problem that this study seeks to address is *the low usage of EIS in organisations by executives*. To provide a solution to the research problem, a research model from organisational behaviour as a theoretical foundation is employed. The main objective of this study is therefore to investigate and examine cultural, social, and organisational factors that explain senior managers' behaviour in accepting and using EIS. The following research questions are addressed in this study to provide answers to the research problem and the next subheading examines the theoretical foundation for the study.

1. *What are the social, cultural and organisational factors that explain senior managers' behaviour towards using EIS?*
2. *What are the importances of these factors in determining EIS usage by senior managers of organisation?*

## THEORETICAL PERSPECTIVE IN IS RESEARCH

A number of theories are used in IS research areas to explain individuals' behaviour towards computers. Candidates among these theories include, task technology fit model (e.g., Dishaw and Strong, 1997); Institutional Theory, Coordination Theory and Organisational Complexity Model (e.g., Yager, 1997); Contingency Model (e.g., Lauer and Rajagopalan, 2002); Variance Theory and Process Theory (e.g., Seeley and Targett, 1999); General System Theory (e.g., Raisinghani and Schkade, 1997); Diffusion Theory (e.g. Raisinghani and Schkade, 1997; Mao, 2002); Activity Theory (e.g., Verenikina and Gould, 1997) and the Theory of Plan Behaviour (Mathieson, 1991; Taylor and Todd, 1995).

These theories have been acknowledged in IS research because they assist researchers to gain a useful insight into the reaction of people towards computer technology and factors enabling the reactions. For instance, Activity Theory aims to explain the connection between human psychology and computer interface design in a social work environment. This establishes the relationship between human computer interactions and computer interface design by taking into consideration the context of the work environment (Verenikina and Gould, 1997). Also, Task-Technology Fit Model aims to match the capability of the technology to the demand of the technology in a work environment (Dishaw and Strong, 1997).

Unfortunately, none of the above theories examines explicitly organisational contextual factors such as cultural, social, organisational variables that can explain executives' behaviour towards EIS adoption and use because they have insufficient reference variables. The Technology Acceptance Model (TAM) (Davis, 1989, 1993 Davis et al., 1992), which is derived from the Theory of Reason Action (TRA) (Fishbein, 1979), has been widely used, as a theoretical foundation to explain IS acceptance and usage. Moreover, Triandis' (1979) framework has been used as a theoretical foundation by previous studies (e.g., Bergeron et al., 1995; Ditsa, 2002, 2003) to address explicitly the social, culture and organisational factors that can explain executives' behaviour towards the adoption and usage of EIS for strategic activities. Both TAM and Triandis' framework have separately guided several researchers (Davis 1989; Davis, et al., 1992, Davis, 1993; Dishaw & Strong, 1997; Srivihok, 1999; Kwon & Chidambaram, 2000; Mao, 2002; Thompson et al., 1991; Bergeron et al., 1995; Ditsa, 2002, 2003) to explain human behaviour towards the adoption and use of computers. This paper uses TAM and Triandis' framework as theoretical foundations. The paper extends TAM with variables - habits, facilitating conditions and social factors - from Triandis' framework to derive a research model suitable for the adoption and use of EIS by organisational executives.

## TECHNOLOGY ACCEPTANCE MODEL (TAM)

Davis developed TAM to explain human computer-usage behaviour using Fishbein and Ajzen's (1975) TRA as the theoretical basis. The objective of TAM is to provide explanation of the determinants of computer acceptance that is capable of explaining the behaviour of users across a broad range of end-user computing and user populations while simultaneously being parsimonious and theoretically justified (Davis, 1989). TAM uses TRA to specify causal linkages between two relevant sets of constructs - perceived usefulness (PU) and perceived ease of use (PEOU) - and user attitude (A), behavioural intention (BI) and actual computer usage behaviour.

Davis et al., (1989, p. 320) define PU as the user's "subjective probability that using a specific application system will increase his/her job performance within an organisation context". Davis defines PEOU as "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (Davis, 1993 p. 447). While PEOU relates to the assessment of the intrinsic characteristics of IT such as ease of use, ease of learning, flexibility and clarity of its interface, PU on the other hand is a response to user assessment of its extrinsic, i.e., task-oriented, outcomes: how IT helps users achieve task-related objectives, such as task efficiency and effectiveness (Gefen and Straub, 2000). According to TAM both PU and PEOU influence an individual's attitude towards using computers. PU and attitude influence the behaviour intention to use the system. Actual system use is predicted by the behaviour intention. Davis et al.,(1989) note the arrows in TAM in Figure 1 below to indicate the probable causality.

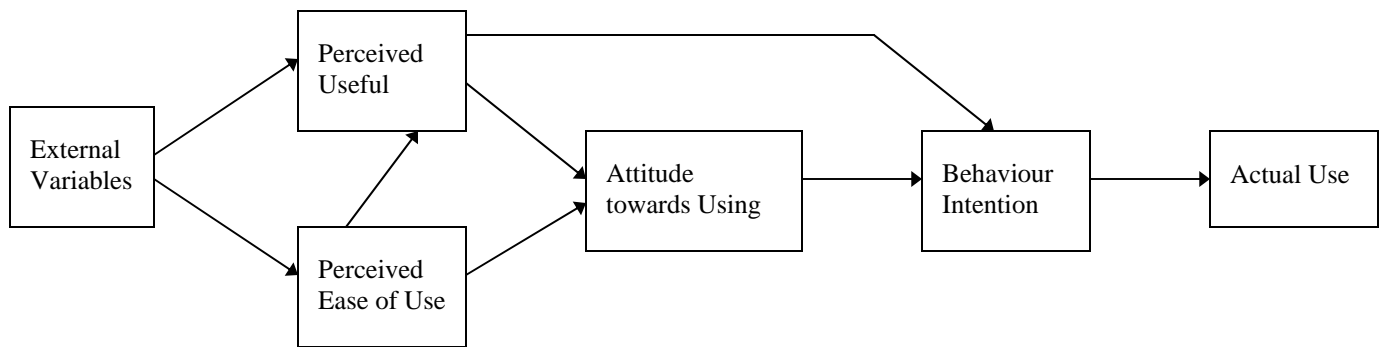


Figure 1: Technology Acceptance Model

A review of scholarly research on IS acceptance and usage suggests that TAM has emerged as the most influential model in this stream of research (Robey, 1996; Davis 1989; Davis et al., 1989) including e-commerce and the adoption of Internet technology (e.g., Gefen and Straub, 2000) as well as, Knowledge management systems (e.g., Money & Turner, 2004). TAM with its original emphasis on system design characteristics represents an essential theoretical contribution in understanding IS usage and acceptance behaviours (Davis et al., 1989). For instance, Davis (1989) originally examined an email system and file-editor used at the time at IBM Canada and found the PEOU and PU of TAM to be significantly correlated with self-reported use of the system. On the contrary however, TAM does not account for habits, facilitating conditions and social factors variables provided by Triandis' framework that influence behaviour.

Davis et al. (1989) realised that the omission of subjective norm from TAM represents an important area that requires further study. Moreover, they observed that the theoretical basis of TRA makes it difficult to distinguish if behaviour is caused by the influence of referent on one's intent or by one's own attitude. Davis (1986) for instance noted that "the subject may want to do what Referent X thinks he/she should do, not because of X's influence, but because the act is consistent with the subject's own [attitude]". Thus, Davis and Davis et al. underscored the importance of social norms that can explain behaviour. Nonetheless, they highlighted the importance of the development knowledge from TAM. In this paper we use TAM as the basis of the conceptual model and incorporate social factors, habits and facilitating conditions from Triandis' framework as an extension. We examine the selected Triandis' (1979) framework variables that are relevant to the paper in the next section.

## TRIANDIS' THEORETICAL FRAMEWORK

Triandis (1979) presents a theoretical framework with the central theme which focus on the relationships of values, attitude, and other acquired behavioural dispositions to action or behaviour. The framework defines the relationship involving these concepts.

The variables to be used from Triandis' framework for the study are: *Social factor*, *Habits* and *Facilitating conditions*. This study examines this subset of Triandis' framework. For a thorough discussion of the model, the reader should refer to Triandis (1979).

**Habits:** Triandis defines as "situation-behaviour sequences that are or have become automatic such that they occur without self-instruction" (p. 204).

**Facilitating conditions:** He defines as "objective factors which are out there in the geographical environment such that several judges or observers can agree make an act easy to do" (p. 205). *Acts* he says are socially defined pattern of muscle movements.

**Social factors:** Personality, Triandis states, internalises the cultural way of perceiving the social environment, called the subjective culture of the group. The subjective culture consists of: *norms* (self-instruction to do what is perceived to be appropriate by members of the culture in certain situations); *value* (the tendencies to prefer a state of affairs over an other; *roles* (appropriate behaviour by a person holding an office in a group) and, *social situation* (a behaviour setting at where more than one person is present). The internalisation of a culture, Triandis argues, forms the social factors that influence the intention to behave. We develop the research model for the study in the next section.

## THE RESEARCH MODEL

The research model (Figure 2 below) is based on TAM plus an extension derived from selected variables - habits, facilitating conditions and social factors – from Triandis' framework. As far as possible all constructs in the research model are operationalised on the basis of previous studies.

Habits consist of EIS experience and ability to use EIS. According to Triandis (1979), habits are what people usually do and the individual is usually not conscious of the sequences, for example, driving a car. Triandis links habits to an individual past experience and ability to perform a given act. He argues that the habitual nature of a behaviour will have an influence on the individual response to a given situation. He further argues that for many behaviours habit is more important than intentions (Triandis, 1979). Accordingly, habits are measured by assessing the number of years of executives' experience in using EIS and their ability to use EIS (Bergeron et al., 1995; Ditsa, 2002, 2003). Shneiderman (1998) classified computer users into novice users, knowledgeable intermittent (casual users) and frequent (expert users). The ability of executives to use EIS will be measured by assessing executive user class.

The facilitating conditions consist of EIS development processes, EIS management processes and organisational environment variables. The first variable is measured by assessing the degree to which the EIS development process in an organization facilitates the use of EIS by the executives using similar questions used by prior studies (e.g., Nandhakumar & Jones, 1997; Ditsa, 2002, 2003) using five-point Likert scales. The second variable is measured by assessing the degree to which the EIS management process facilitates executives' use of the systems using similar questions used by Nandhakumar and Jones, (1997) and (Ditsa, 2002, 2003) using five point Likert scales. The third variable is measured by assessing the degree to which an organizational environment facilitates the use of EIS by the executives using five similar questions derived from Nandhakumar & Jones (1997) and, McBride, (1997) and Ditsa (2002, 2003), using five-point Likert scales with 1 for strongly disagree and 5 for strongly agree. These scales are found to be reliable with Cronbach's alpha equal to 0.76, 0.74 & 0.70 respectively (Ditsa, 2002, 2003).

Social factors consist of subjective norms, subjective roles, subjective values and subjective social situations. In EIS research domain the social factors have been referred to the executives' work group influence such as, peers; superiors' subordinates and IS directors acting upon their EIS use (Bergeron et al., 1995; Ditsa, 2002, 2003). The social factors' variable are measured as follows: The subjective norms (self-instructions to do what is perceived to be correct and appropriate by the work group) are measured by obtaining users' assessment of the influence of the work group upon their behaviour in general (four 5-point Likert scales (-2: strongly disagree, +2: strongly agree) and multiplied by evaluating their probability that the work group wants them to use EIS (Bergeron et al., 1995; Ditsa, 2003). Subjective roles (an expected correct behaviour from executive users of EIS) are measured by obtaining executives' assessment of their roles and expected behaviours from group work in relation to EIS usage using four 5-point Likert scales. Subjective values (the broad tendencies of the executives' work group to prefer a certain state of affairs over others in relation to EIS usage) are measured by obtaining executives' assessment of the work group influence in relation to EIS usage using 5-point Likert scale. Subjective social situations of the workplace setting are measured by obtaining executives' assessment of their interpersonal relationships with their peers, superiors, subordinates, the IS directors and the EIS support group in relation to EIS usage. Five 5-point Likert scales are used for the measure. The scales were obtained from past studies (e.g., Bergeron et al., 1995; Ditsa, 2003) as they appear to be reliable with a Cronbach's alpha of 0.81, 0.9 and 0.86.

Both the PU and PEOU constructs are operationalised by obtaining users' assessment of their PU and PEOU of EIS based on 12 similar items, six items for each developed, refined and streamlined by Davis (1989) using 7-point Likert scales. Thus, PU and PEOU are adapted from several IS studies (e.g., Davis, 1989; Davis et al., 1989; Matheison, 1991; Venkatesh & Davis, 1996;

Moore & Benbasat, 1991; Venkatesh et al., 2003). Prior studies (e.g., Davis, 1989) demonstrate the validity and reliability of PU and PEOU with Cronbach alpha of 0.98 and 0.94 respectively (Davis, 1989). However, the scales have been adjusted to 5-point Likert scale, with one being the negative end of the scale and five being the positive end of the scale. The adjustment was based on the advice by the statistician assigned to the project and the pre-test results.

Attitude towards usage are measured using five standard 5-point semantic differential scales for operational attitude toward behaviour: “All things considered my using EIS in my job is Good – Bad; Wise – Foolish; Favourable – Unfavourable; Beneficial – Harmful; and Positive – Negative” on 5-point scale with midpoint labelled “Neutral”. Although, Azjen & Fishbein, (1980) suggested five standard 7-point semantic differential rating scales, the scales have been adjusted to 5 based on the advice by the statistician on the project and the outcome of pre-test. Attitude measurement is therefore adapted from prior IS studies (e.g., Robey, 1979; Davis, 1989; Davis, 1993; Malhotra & Galletta, 1999; Hubona & Jones, 2002; Mao, 2002).

Actual system use construct is measured by obtaining users assessment in terms of frequency of use, (‘how often’). Similar measures have been used in research on TAM (e.g., Davis, 1989; Davis et al., 1989; Malhotra & Galletta, 1999; Hubona & Jones, 2002; Ditsa, 2003). Obtaining users’ assessment of the number of times they use EIS in a week and/or their frequency of using EIS is the first measure. The Likert scales used for the measurement are adapted from Davis (1989) and other prior IS research studies (e.g., Davis, 1989; Mathieson, 1991; Moore & Benbasat, 1991; Adam et al., 1992; Davis, 1993; Venkatesh & Davis 1996; Mao, 2002; Hubona & Jones, 2002; Venkatesh et al., 2003). The scales have been adjusted from 7-point to 5-point scales with one being the negative end of the scale and five being the positive end of the scale based on the advice of a statistician and pre-test result.

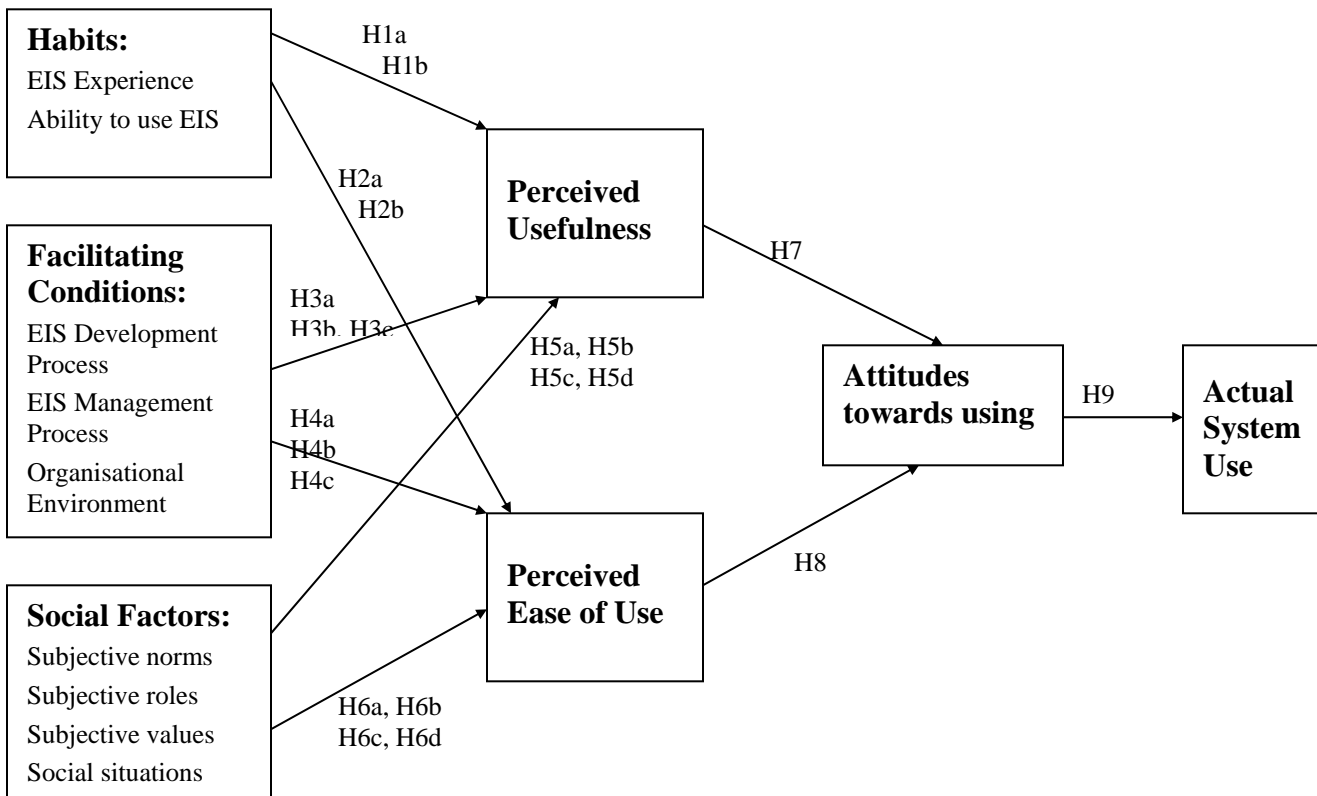


Figure 2: The Research Model

## HYPOTHESES AND IMPLICATIONS OF THE MODEL

Triandis (1979) states that habits can be measured based on individual experience and ability in performing a given task. Prior research has shown that habits are a strong predictor of behaviour. For instance as referenced (Sugar, 1967) in Thompson et al., (1991) measured the attitudes, norms and habits of college students regarding cigarette smoking. On separate occasion, the same students were offered a cigarette. The strongest single predictor of behaviour was habit, followed by norms and then attitudes. Furthermore, in EIS domain, habits have been operationalised on the basis of EIS experience and the ability to use EIS (Ditsa, 2002, 2003). In their study, Dambrot et al., (1988), indicate that subjects who failed an assembly language programming course had significantly less computer experience than those who did not fail the course. In his study of text editing, Rosson (1983) explains that experience was positively correlated with the number of lines edited per minute. Elkerton and Williges (1984)

indicate in their work that experience explains more variance in information search times than does other individual variables. According to Zmud (1979) people's level of education influence their successful use of computer systems. More educated computer users significantly outperformed less educated people in training environments (Davies & Davies 1990). It has been documented that a higher level of education negatively relate to computer anxiety whilst positively relate to favourable computer attitude. According to Lucas (1978), less educated individuals have more negative attitudes in using computer technology than individuals with better education. Education is effective in overcoming negative attitudes towards computers (Harrison and Rainer, 1992). Hubona and Jones (2002) found in their study of user acceptance of email that length of time since first use and level of education directly influence email usage behaviour. Education and length of time in using information technology parallel individual experience and ability to use computers. Accordingly, we hypothesised that:

*H1a: EIS experience will have a positive effect on perceived usefulness of EIS.*

*H1b: Ability to use EIS will have a positive effect on perceived usefulness of EIS.*

*H2a: EIS experience will have a positive effect on perceived ease of use of EIS.*

*H2b: Ability to use EIS will have a positive effect on perceived ease of use of EIS.*

Triandis (1979) argues that behaviour will not occur if objective factors (facilitating conditions) of the geographical environment prevent it. In the information technology domain, facilitating conditions have been operationalised as EIS development process, organisational environment and EIS management process (Ditsa, 2002; 2003). Research efforts in EIS development (e.g., Watson, et al., 1991; Rainer & Watson, 1995; Srivihok, 1999) have sought to understand the factors contributing to cost-effectiveness of EIS projects in organisations. Findings have linked this research to factors such as general top management support, committed executive sponsor, managing user resistance and expectations, managing system spread and evolution, delivering first version of the system quickly, employing evolutionary development process, involving users in the development and linking the development to business objectives (Watson, et al., 1991; Nandhakumar & Jones, 1997; McBride, 1997; Srivihok, 1999; Poon & Wager, 2001). In addition, it is linked to employing appropriate technology such as hardware and software, IS staff and managing data problems (Kelly, 1994; Rainer & Watson, 1995). Accordingly, we hypothesised that:

*H3a: EIS development processes will have a positive effect on the perceived usefulness of EIS.*

*H3b: EIS management processes will have a positive effect on the perceived usefulness of EIS.*

*H3c: Organisational environment will have a positive effect on the perceived usefulness of EIS.*

*H4a: EIS development processes will have a positive effect on the perceived ease of use of EIS.*

*H4b: EIS management processes will have a positive effect on the perceived ease of use of EIS.*

*H4c: Organisational environment will have a positive effect on the perceived ease of use of EIS*

The internalisation of the reference group's subjective culture and specific interpersonal agreements that the individual has made with others, in specific social situations, Triandis (1979) argues, constitutes the social factors that determine behavioural intention. He defines subjective culture as, "human group characteristic way of viewing the human-made part of the environment" (p. 208), consisting of ways of categorising experience such as values, norms and roles and social situations. In the information systems research domain, superior, peer and subordinate influences have been strong determinants of subjective norms (Mathieson, 1991; Taylor & Todd, 1995; Venkatesh & Davies, 1996; Elkordy, 2000; Ditsa, 2002). Mao (2002) investigated the IT usage behaviour of 80 end-users in four organisations at two points in time based on the TAM model with the subjective norm as a construct of the research model. It was implied that the subjective norms play a more important role in the long run within the group. Referenced by Mao (2002) found subjective norm to be a significant determinant of IS usage. Also, Kwon & Chidambaram (1999) studied the patterns of cellular phone adoption and usage in an urban setting. They found social pressure to have positive outcome among professionals as a motivation to adopt and use the systems. Igbaria (1993) studied microcomputer usage in organisations and found social norms to have significant effects on system usage. In his studies, Rogers (1986), indicates the importance of social norms on the rate of the diffusion of innovation.

In the social psychology domain, Lieberman examined how workers' attitudes change as a result of job promotions. He measured the attitudes of plant workers and then reassessed after some were promoted to foreman (a management position) and some as shop stewards. Not surprising after the promotions the foremen were more pro-company than they had been as workers, whereas the shop stewards had become more pro-union. More interestingly however, when the company later experienced financial problems and had to demote the foremen to their previous rank-and-file positions they returned to their original attitudes (Westen, 1996). This shows that individual's attitude has a significant influence on his/her behaviour.

Triandis (1979) argued that a behaviour setting in social situations has a time-place coordinates, physical entities and processes and, it evokes particular behaviours that distinguish it from what is outside of it. It has structural features, and exists independently of any particular individual's perception of it. Triandis sets an example of this as a classroom with a particular location and time where members meet. The class has chairs, walls and black boards and in it members act in certain ways including talking,



listening, writing, take notes and others. According to Triandis' work "social situation in a behaviour setting is a bounded, self-regulated and orderly system composed of replaceable human and non-human components that interact in a synchronised fashion in carrying out an orderly sequence of events such as the setting program" (Triandis 1979, p. 214).

In EIS studies, (e.g., Bergeron, 1995; Ditsa, 2002, 2003) social factors are defined as executive's work group (peers, superior, subordinates, IS directors). In several studies social factors have shown strong influence on behaviour and utilisation of IS including EIS (Thompson et al., 1991; Bergeron et al., 1995; Ditsa, 2002, 2003; Venkatesh et al., 2003). This suggests that the social factors of the conceptual model will relate strongly with behaviour. Thus we hypothesised that:

*H5a: Subjective norms will have a positive effect on perceived usefulness.*

*H5b: Subjective roles will have a positive effect on perceived usefulness.*

*H5c: Subjective values will have a positive effect on perceived usefulness.*

*H5d: Subjective social situation will have a positive effect on perceived usefulness.*

*H6a: Subjective norms will have a positive effect on perceived ease of use.*

*H6b: Subjective roles will have a positive effect on perceived ease of use.*

*H6c: Subjective values will have a positive effect on perceived ease of use.*

*H6d: Subjective Social situation will have a positive effect on perceived ease of use.*

Research indicates that a voluntary computer usage is driven to a large extent by PU (Davis, et al., 1992). Robey (1979) studied industrial sales forces and observed that users' expected performance impacts of a computerised sales record-keeping system were positively correlated with the measure of actual use of the system. Other MIS studies, (e.g., Davis, 1989; Mathieson, 1991; Davis et al., 1992; Adams et al., 1992; Davis, 1993; Taylor & Todd, 1995; Venkatesh & Davis, 1996; Dishaw, & Strong, 1997; Kwon & Chidambaram, 2000; Elkordy, 2000; Mao, 2002; Ditsa, 2002, 2003) have shown that PU and PEOU are strong determinants of user acceptance and adoption of computer technology. Research on the adoption of innovation has suggested a relevant role for PU and PEOU. According to Rogers (1986), relative advantage and compatibility are important attributes of innovations affecting adoption. Rogers (1986) suggested a number of sub-dimensions of relative advantage including the degree of economic profitability, decrease in discomfort and saving in time. Also, Davis (1989) argued that compatibility, relative advantage and complexity have the most consistent significant relationships across a broad range of innovation types. PU parallels relative advantage (Mao, 2002) and PEOU parallels compatibility and complexity of innovations (Davis, 1989). This finding is consistent with the finding of Tornatzky and Klein (1982) in their meta-analysis of innovation diffusion literature. Tornatzky and Klein reviewed 75 articles and discovered more than 30 innovation characteristics. They investigated ten major innovation characteristics including: compatibility, relative advantage, complexity, communicability, cost, divisibility, profitability, social approval, observability and trial ability and found compatibility, relative advantage and complexity to strongly measure innovation attributes affecting innovation diffusion. Thus, we hypothesised that:

*H7: Perceived usefulness will have a positive effect on the attitudes towards using EIS.*

*H8: Perceived ease of use will have a positive effect on attitudes towards using EIS.*

Fishbein (1979, p. 68) defined attitude as, "a function of beliefs". Fishbein and Ajzen (1975) distinguished between beliefs and attitudes and specified how external stimuli like objective feature of attitude object such as individuals, situation and social groups can be causally linked to beliefs, attitudes and behaviour. According to Fishbein and Ajzen (1975), individual beliefs about the behaviour also known as the perceived consequence of the behaviour, refers to an individual's subjective likelihood that performing the behaviour will lead to certain outcome (p.233). On the other hand, attitudes toward the behaviours are an effective evaluation of the behaviour. Attitude towards the behaviour is determined by an expectancy-value model of beliefs (Fishbein, 1979, p.68) weighted by the evaluations of the consequences (Fishbein and Ajzen, 1975, p.233). In their study, they draw a distinction between two separate attitude constructs such as attitude towards the object and attitude towards the behaviour. The former refers to an individual's effective evaluation of a specified attitude object while the latter refers to an individual's evaluation of a specified behaviour that involves the object (Fishbein & Ajzen, 1975; Davis, 1993). This paper employs attitude towards the behaviour because research studies (e.g., Ajzen & Fishbein, 1975; Davis, 1993; Robey, 1979; Dishaw & Strong, 1997; Galletta & Malhotra, 1999; Srivihok, 1999; Mao, 2002; Hubona & Jones, 2002; Lim, 2002; Venkatesh et al., 2003) have shown that attitudes toward the behaviour relate more strongly to a specified behaviour. We therefore hypothesised that:

*H9: Executives' Attitudes towards using EIS will have a positive effect on actual use of EIS.*

# RESEARCH METHODOLOGY

## Data Collection Methods

The data for the pilot study was collected by mail survey from two large organisations in the Illawarra region of Australia identified as using EIS. The main concern of the pilot was to further pre-test the questionnaire as well as serve as exploratory study for the main study to validate the research model.

## Questionnaire Design

A six-page questionnaire was designed for the pilot. Each question represents component of the research model. The questions are selected for their theoretical importance and potential relevance to practice. Each appointment time a statistical consultation was made with the Statistical Consultation Service in the University of Wollongong to verify the statical validity of the research model, hypotheses and questionnaire. The questionnaire was pre-tested on four academics and based on the feedback received from the representatives, some modifications were made to the individual questions and instructions.

The revised questionnaire was then subjected to the next phase of pre-testing with academics and four doctoral students drawn from the Faculty of Commerce at the University of Wollongong where the research is taking place. All comments and suggestions given by them regarding the clarity, validity and consistency of the questions were incorporated into the survey instrument.

A cover letter explaining the purpose of the survey has been designed. It was mailed with a prepaid envelope to the participants for the pilot study. The cover letter has a statement guaranteeing the confidentiality of the respondents and a statement of how the research has been reviewed by the Human Research Ethics Committee (HREC) as required in Australia.

Although there is no widely agreed sample size for a pilot survey, between 12 and 30 subjects is generally recommended (e.g., Hunt et al., 1982). The pilot survey was carried out on a representative sample of 30 executives who actually use EIS. After a follow-up by telephone calls 19 returns were received giving a response rate of 63 percent. The returned questionnaires were carefully examined for signs that respondents had difficulty in understanding the questions. All the 19 questionnaires returned were good for analysis. There were some suggestions and comments from respondents, which were noted to improve the questions for the main study

## Data Analysis and Preliminary Results

Due to the size of the data for pilot study, a qualitative analysis of the data was carried out. Among the 19 participants for the pilot, the results show that 14 were males while 5 were females. Although there are other age groups used in the study as shown by the dotted lines in Table 2 below, the results show that on average, EIS users are between 46 - 55 years of age. At the educational level, the results show that the majority (10) of EIS users are postgraduate degree holders while the seven (7) users are undergraduate degree holders. Regarding the management levels held among participants in their respective organisations, the results show that majority of EIS users (9) are from the middle management level while five (5) are from the top-level management. The latter finding confirms the finding of Fitzgerald (1998) that the majority of EIS users are middle managers rather than the top-level managers.

Gender		Age			Management Levels			Education		
Male	Female	---	46 - 55	---	Top Management	Middle Management	Others	Postgraduate	Undergraduate	Others
14	5		46 - 55		5	9	5	10	7	2

Table 2: A Tabular View of the Preliminary Results

The preliminary results suggest that first, executives' experience in EIS positively relates to their experience in computer- based information systems (CBIS). Second, the result suggests that although some managers have significant knowledge in EIS due to length of use, executives who have been using EIS applications for a greater length of time have greater knowledge of the systems.

Third, the results suggest a high degree of perceived usefulness, perceived ease of use as well as a positive attitude towards using EIS by executives. This may be due to the value outcome, user-friendliness and clarity of the systems to users.

Furthermore, the results suggest that executives consider social factors in using EIS in their work. Finally, the results suggest facilitating conditions variables such as EIS development process, EIS management process and organisational environment are strongly related to the adoption and use of EIS by executives.

## CONCLUSIONS AND FUTURE DIRECTION

Based on the preliminary results of this study, we can argue that organisational contextual factors such as cultural, social individual factors (McBride, 1997; Davis, 2001) are of vital importance in explaining executives' behaviour towards the adoption and use of EIS at the strategic management level.

At the time of submitting this paper, about 700 questionnaires have been prepared for the main survey. The questionnaires will be mailed out to mainly executives such as CFOs, CEOs and other top-level managers in 200 organisations using EIS in Australia.

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